

**PRELIMINARY AMENDMENT**

Serial Number: 09/132,157

Filing Date: August 11, 1998

Title: SILICON-GERMANIUM DEVICES FOR CMOS FORMED BY ION IMPLANTATION AND SOLID PHASE EPITAXIAL REGROWTH

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Dkt: 303.229US2

wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region [has a channel length less than  $7\mu\text{m}$ ] is formed subsequent to formation of the gate oxide

25. (Twice Amended) A p-channel metal-oxide-semiconductor transistor formed on a silicon substrate, comprising:

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F2  
a  $\text{Si}_{1-x}\text{Ge}_x$  channel region, having a germanium molar fraction of  $x$ , and formed in the substrate, underneath a gate oxide and between a source region and a drain region without a silicon layer interposed between the  $\text{Si}_{1-x}\text{Ge}_x$  channel region and the gate oxide;

Sub  
G3  
wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region is formed from ion implanting germanium (Ge) into the substrate at a dose of approximately  $2 \times 10^{16}$  atoms/ $\text{cm}^2$ , and wherein the Ge is implanted at an energy of approximately 20 to 100 keV; and

wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region [has a channel length less than  $7\mu\text{m}$ ] is formed subsequent to formation of the gate oxide.

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G4  
F3  
28. (Thrice Amended) A p-channel metal-oxide-semiconductor transistor formed on a silicon substrate, comprising:

a  $\text{Si}_{1-x}\text{Ge}_x$  channel region, having a germanium molar fraction of 0.2, and formed in the substrate, underneath and adjoining a gate oxide and between a source region and a drain region;

wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region [has a channel length less than  $7\mu\text{m}$ ] is formed subsequent to formation of the gate oxide.

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G5  
30. (Thrice Amended) A p-channel metal-oxide-semiconductor transistor on a silicon substrate, wherein the transistor includes a channel comprising a silicon-germanium (Si-Ge) alloy underneath and adjoining a gate oxide, wherein the [channel has a channel length less than  $7\mu\text{m}$ ] silicon-germanium alloy is formed subsequent to formation of the gate oxide.

F4  
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G6  
38. (Once amended) A p-channel metal-oxide-semiconductor transistor, comprising:  
a silicon substrate;

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#4

a gate oxide, coupled to the substrate;  
a gate, coupled to the gate oxide;  
source/drain regions formed in the substrate on opposite sides of the gate; and  
a  $\text{Si}_{1-x}\text{Ge}_x$  channel region, having a germanium molar fraction of  $x$ , and formed in the substrate, underneath and adjoining the gate oxide and between the source/drain regions;  
wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region is formed from ion implanting germanium (Ge) through the gate oxide; and  
wherein the germanium molar fraction is less than about 0.6.

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C7

40. (Once amended) A ~~p-channel metal-oxide-semiconductor~~ transistor formed on a silicon substrate, comprising:  
a  $\text{Si}_{1-x}\text{Ge}_x$  channel region, having a germanium molar fraction of  $x$ , and formed in the substrate, underneath and adjoining a gate oxide and between a source region and a drain region;  
wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region is formed from ion implanting germanium (Ge) through the gate oxide; and  
wherein the germanium molar fraction is less than about 0.6; and  
wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region has a channel length less than  $7\mu\text{m}$ .

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H8

41. (Once amended) A ~~p-channel metal-oxide-semiconductor~~ transistor formed on a silicon substrate, comprising:  
a  $\text{Si}_{1-x}\text{Ge}_x$  channel region, having a germanium molar fraction of  $x$ , and formed in the substrate, underneath a gate oxide and between a source region and a drain region without a silicon layer interposed between the  $\text{Si}_{1-x}\text{Ge}_x$  channel region and the gate oxide;  
wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region is formed from ion implanting germanium (Ge) into the substrate through the gate oxide at a dose of approximately  $2 \times 10^{16}$  atoms/cm<sup>2</sup>, and wherein the Ge is implanted at an energy of approximately 20 to 100 keV; and  
wherein the germanium molar fraction is less than about 0.6; and  
wherein the  $\text{Si}_{1-x}\text{Ge}_x$  channel region has a channel length less than  $7\mu\text{m}$ .